

### **REMARKS**

Claims 1 and 84-115 are pending. Applicants respectfully request entry of the claim amendments listed above. Claims 1, 89-90, 95-100, 102-104, and 106-107 have been amended for clarification and the features of previous claims 90 and 101 have been incorporated into the currently amended Claim 1. Supports for the amendments of Claims 89, 90, and 97 can be found, at least, in claims 4-5 as originally filed, paragraph [0070] of page 27, paragraph [0131] on pages 54-55, paragraph [0155] on page 65, and paragraph [0168] on page 71. Claim 101 has been cancelled without prejudice.

#### **First Rejection Under 35 U.S.C. §103**

Claims 1, 84-86, 90-97, 99-100, and 104-109 are rejected under 35 U.S.C. § 103(a) for obviousness over Parra *et al.* (2001) Am. J. Physical Antropol. Vol. 114(1):18-29 in view of Cargill *et al.* (1999) Nature Genetics Vol. 22:231-238.

Applicants respectfully traverse this obviousness rejection. However, to expedite the prosecution of the subject application, Claim 1 has been amended to incorporate features from the previous Claim 101. Without acquiescing to the Examiner's assertions, Applicants note that the previous Claim 101 is not rejected by the combination of Parra *et al.* and Cargill *et al.* Accordingly, the currently amended Claim 1 is not obvious over the combination of Parra *et al.* and Cargill *et al.*, and withdrawal of this obviousness rejection is respectfully requested.

#### **Second Rejection Under 35 U.S.C. §103**

Claims 1, 84-97, 99-100, and 104-115 are rejected under 35 U.S.C. § 103(a) for obviousness over Parra *et al.* (2001) Am. J. Physical Antropol. Vol. 114(1):18-29 in view of Cargill *et al.* (1999) Nature Genetics Vol. 22:231-238, and further in view of Sorenson *et al.* (US 2003/0172065).

Applicants respectfully traverse this obviousness rejection. However, to expedite the prosecution of the subject application, Claim 1 has been amended to incorporate features from the previous Claim 101. Without acquiescing to the Examiner's assertions, Applicants note that the previous Claim 101 is not rejected by the combination of Parra *et al.*, Cargill *et al.*, and Sorenson *et al.* Accordingly, the currently amended Claim 1 is not obvious over the combination of Parra *et al.*, Cargill *et al.*, and Sorenson *et al.*, and withdrawal of this obviousness rejection is respectfully requested.

### **Third Rejection Under 35 U.S.C. §103**

Claims 1, 84-101, and 104-115 are rejected under 35 U.S.C. § 103(a) for obviousness over Parra *et al.* (2001) Am. J. Physical Antropol. Vol. 114(1):18-29 in view of Cargill *et al.* (1999) Nature Genetics Vol. 22:231-238, in view of Sorenson *et al.* (US 2003/0172065), and further in view of Shriver *et al.* (1997) American Journal of Human Genetics Vol. 60:957-964. Applicants respectfully traverse the Examiner's assertions.

In particular, the Examiner states the following:

"Parra, Cargill, and Sorenson make obvious the method of claims 1, 84-87, 99-100, and 104-105, as set forth above. Parra also shows two-way and three-way comparison of populations that are both intracontinental and intercontinental [Table 1, Fig. 1, and p.22]. Parra Cargill, and Sorenson do not teach performing a likelihood determination for affiliation with an East Asian ancestral group, as in claim 98."

Lines 13-18, page 10 of the Office Action dated November 9, 2010.

First, the Federal Circuit has held that it is improper to single out a statement out of context because of improper hindsight analysis, stating that:

"It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art. [citing *In re Wesslau*, 353 F.2d 238, 241 (CCPA 1965) and *In re Mercer*, 515 F.2d 1161, 1165-66 (CCPA 1975)] ...

The district court improperly viewed an isolated line in Caddell in light of the teaching of the '814 patent to hold for obviousness. This is improper hindsight analysis."

*Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 448 (CAFC, 1986).

Furthermore, the *In re Mercer* opinion also emphasizes the it is improper to ignore a portion of a reference, stating that:

"The relevant portions of a reference include not only those teachings which would suggest particular aspects of an invention to one having ordinary skill in the art, but also those teachings which would lead such a person away from the claimed invention."

*In re Mercer*, 515 F.2d at 1161, 1166 (CCPA 1975).

Applicants respectfully submit that the Examiner fails to consider the Parra *et al.* as a whole for the purpose of establishing a *prima facie* case of obviousness. It is improper for the Examiner to ignore the teaching of Parra *et al.* where the disclosure of Parra *et al.* only focuses on ancestral proportions of populations, not proportional ancestry of a test individual as recited in Claim 1. In addition, the disclosure of Parra *et al.* is limited to small numbers of samples (see page 19 of Parra *et al.*; only 46-183 samples are used). On the other hand, the advantage of the claimed invention is to use a large number of samples (for example, 2,024 international samples are used in paragraph [0227] on pages 104-105 in Example 2 of the specification). Parra *et al.* neither discloses nor suggests a method for proportional ancestry of a test individual using such large number of samples. Applicants submit that those skilled in the art would not have been motivated to modify Parra *et al.* as suggested by the Examiner.

Second, Applicants respectfully submit that Parra *et al.* in fact teaches away from the claimed invention. For example, the disclosure of Parra *et al.* states the following:

“The selection of parental population is a **key aspect** of any study of admixture. The samples used in our study as representative of parental populations are from areas known to have contributed substantially to the population of African and European ancestry currently living in the US.” [emphasis added].

Las paragraph on Col. 1 to the first paragraph on Col. 2, page 19 of Parra *et al.*

Accordingly, Applicants submit that the teaching of Parra *et al.* is entirely opposite to the claimed invention, where the methods of the claimed invention starts with multiple ancestral groups without prior knowledge and then identify “ancestral groups having the greatest likelihood values.” The currently amended Claim 1 does not require prior knowledge about which ancestral groups are most relevant. In fact, the purpose of the currently amended Claim 1 is to “identify” which ancestral groups are most relevant. On the contrary, Parra *et al.* teaches that prior knowledge of parental population is a “key aspect” of any study of admixture. Thus, Applicants conclude that Parra *et al.* teaches away from the claimed invention and those skilled in the art would not have been motivated to reverse the “key aspect” of Pritchard *et al.* In addition, there cannot be a reasonable expectation of success where the disclosure of Pritchard *et al.* teaches the opposite of the claimed invention.

Third, Applicants submit that the claimed invention is unexpected from the teaching of the references cited by the Examiner. For example, Example 2 of the specification provides that both a four way admixture BGA test and three three-way BGA test provide surprising and unexpected results, stating that:

[0226] This example demonstrates that a four way admixture BGA test provides the same results obtained using three 3 way BGA tests.

[0227] As indicated above, Bio Geographical Ancestry (BGA) is the heritable component of race. ... As disclosed herein, self-reported population affiliations correlated almost perfectly with the majority BGA population affiliation determined for a sample of **2,024 international samples**. ... Because a large number of high .delta. value markers were used, **the test was surprisingly robust**; reasonable levels of simulated allele frequency errors that could be caused by biased parental sampling had no significant impact on the BGA proportions determined. These results demonstrate that BGA admixture can be reliably determined from a DNA sample.

Page 104-105 of the specification as filed [emphasis added].

As discussed above, the teaching of Parra *et al.* is limited to only small numbers of samples (only 46-183 samples are used) and there is neither teaching nor suggestion for a large number of samples (for example, 2,024 international samples tested in Example 2 of the specification) would have work for determining BGA proportions for “each test individual of the samples.” On the contrary, Example 2 demonstrates that the method of the claimed invention can determine “surprising robust” BGA proportions for “each test individual of the 2,024 international samples.” Thus, Applicants submit that the claimed invention is unexpected based on the teaching of cited references including Parra *et al.*

In summary, the Examiner has not established a *prima facie* case of obviousness based on the asserted combination of references, because those skilled in the art would not have been motivated to combine as asserted by the Examiner, and there cannot be a reasonable expectation of success. Further, the claimed invention has unexpected results over the asserted combination references. Accordingly, withdrawal of the obviousness rejection is respectfully requested.

#### **Fourth Rejection Under 35 U.S.C. §103**

Claims 1 and 84-115 are rejected under 35 U.S.C. § 103(a) for obviousness over Parra *et al.* (2001) Am. J. Physical Antropol. Vol. 114(1):18-29 in view of Cargill *et al.* (1999) Nature Genetics Vol. 22:231-238, in view of Sorenson *et al.* (US 2003/0172065), in view of Shriver *et al.* (1997) American Journal of Human Genetics Vol. 60:957-964, and further in view of Pritchard *et al.* (2001) Theoretical Population Biology Vol. 60:227-237. Applicants respectfully traverse the Examiner’s assertions.

In particular, the Examiner states the following:

“Parra, Cargill, Sorenson, and Shriver do not teach generating a graphical representation of the comparison of three ancestral groups, wherein the representation comprises a confidence contour, as in claims 102 and 103.

Pritchard teaches a method for inferring proportional ancestry of different ancestral groups in a population structure using a graphical display format [Fig. 1], as in claims 102 and 103. Points in the extreme corners of the triangular plots are correctly classified [Fig. 1], which shows groups represented in a vertex of a triangle.”

Lines 11-17, page 12 of the Office Action dated November 9, 2010.

Without acquiescing to the Examiner’s assertions, Applicants conclude that the Examiner relies Pritchard *et al.* only for the features recited in Claims 102 and 103. As discussed above, the Examiner has not established a *prima facie* case of obviousness based on the combination of Parra *et al.*, Cargill *et al.*, and Shriver *et al.*, and the disclosure of the cited references including Parra *et al.* actually teaches away from the claimed invention. Further, the claimed invention has unexpected results over the asserted combination. Applicants submit that combination with Pritchard *et al.* cannot cure the defects of the previous asserted combination, and those skilled in the art would not have been motivated to combine Parra *et al.*, Cargill *et al.*, Sorenson *et al.*, Shriver *et al.*, and Pritchard *et al.* as asserted by the Examiner. Further, there cannot be a reasonable expectation of success for the asserted combination and the claimed invention provides unexpected results over the asserted combination.

Accordingly, withdrawal of the obviousness rejection over the combination of Parra *et al.*, Cargill *et al.*, Sorenson *et al.*, Shriver *et al.*, and Pritchard *et al.* is respectfully requested.

In re Application of:  
Frudakis and Shriver  
Application No.: 10/644,594  
Filing Date: August 19, 2003  
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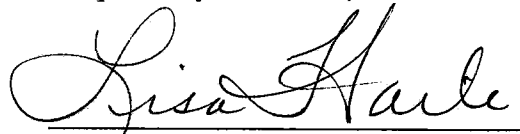
PATENT  
Attorney Docket No. DNA1170-2

### CONCLUSION

Applicants submit that pending claims 1 and 84-100, and 102-115 are in condition for allowance. The Examiner is invited to contact Applicants' undersigned representative if there are any questions relating to this submission.

The Commissioner is hereby authorized to charge a total amount of \$585, which represents payment for the Request for Continued Examination Fee (\$405 small entity) and Information Disclosure Statement fee (\$180) to Deposit Account No. 07-1896. Additionally, the Commissioner is authorized to charge any additional fees required by this submission, or make any credits or overpayments, to Deposit Account No. 07-1896 referencing the above-identified attorney docket number.

Respectfully submitted,



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